# *How to Use This Guide*

This *Quick Reference Dust Control Guide* has been designed by the Blue Skies Campaign for use by persons responsible for the prevention and control of airborne dust caused by earthmoving, vehicle operation, and other construction related activities, as well as subcontractors performing earthmoving, excavation, site watering, and other activities.

The guide is divided into thirteen short subjects, each of which may be suitable for discussion with workers at construction sites.

## *What is Particulate Matter?*

Particulate matter is a mixture of dirt, soil dust, pollens, molds, ashes, soot, and aerosols that remain suspended in the air that we breathe.

Coarse particulate matter, between 2.5 and 10 microns in diameter ($PM_{10}$), is usually caused by construction and earthmoving operations, vehicles moving on paved and unpaved roads, and agricultural activities. Fine particulate matter, measuring less than 2.5 microns, is produced primarily by the exhaust from diesel and gasoline engines.

Earthmoving operations in dry soil can generate significant amounts of airborne dust.

## *The Dangers of Dust*

Particulate matter can be harmful to your health. When inhaled, the coarse particles are deposited in the upper respiratory tract of the body. The fine particles can reach the lower pulmonary tissues and invade the alveoli of the lungs.

Persons at greatest risk from exposure to particulates are the very young, the elderly, and persons with pre-existing heart disease or lung ailments, such as asthma, bronchitis, or emphysema.

In 1995, the Arizona Comparative Environmental Risk Project reported that nearly 700 people die prematurely each year in Maricopa County due to particulates, and concluded that particulate pollution represents one of the highest environmental risks to this State. Fine particulate matter also contributes to the ugly brown cloud that hangs over the Valley and obscures our blue skies.

## *What Is Being Done?*

A 3,000 square-mile area of Maricopa and Pinal Counties has been designated a nonattainment area, because it does not meet the federal air quality standards for particulates smaller than ten microns in diameter ($PM_{10}$).

In addition to negative health effects, being a nonattainment area is a stigma that can slow economic growth and development. Tourists may not visit the Valley, because they perceive it to be too polluted. Persons may avoid moving to the Phoenix area because of the perception of unhealthy air, resulting in lower demand for new housing and office buildings.

A $PM_{10}$ Plan for Maricopa County was approved by the U.S. Environmental Protection Agency on July 25, 2002. The Plan shows how Maricopa County will attain the federal $PM_{10}$ standards by 2006. The Plan has 77 measures to reduce particulate pollution from all significant sources including agriculture, woodburning, driving on paved and unpaved roads, vacant lots, gasoline and diesel exhaust, and earthmoving activities.

## *Maricopa County Rule 310*

The most effective measure in reducing particulates is Maricopa County's Fugitive Dust Control Rule 310. By 2006, Rule 310 is expected to reduce fugitive dust from construction sites and other earthmoving sources by 72 percent.

Compliance with Rule 310 is essential for the Valley to meet the federal standards. If we do not, there will be serious consequences, such as the loss of Federal dollars needed to build highways and light rail. So it is important for every construction worker to do his part to comply with Rule 310 and "bust the dust."

Monitoring sites such as this one measure the concentrations of particulates and other air pollutants.

## *Site Planning*

Take time to consider dust control issues before beginning your project in order to save time, money, and project resources. Identify site-specific air quality and dust control issues up front and develop a consensus for addressing these issues. Phase your project and plan your site layout to minimize disturbance of the soil. Include the following action items:

- Make sure everyone working on the job knows who's in charge and all the requirements for dust control. Encourage a proactive and continuous focus on air quality issues on the job site.
- Evaluate dust control procedures periodically to identify additional issues that develop as the job progresses.
- Limit the amount of area graded at any one time. Lessening the amount of surface being disturbed at any one time reduces the amount of control required and the amount of water or dust suppressant needed.

- Install wind fences or barriers (less than 50 percent porosity). Place barriers around storage piles, parking, and equipment staging areas.

- Develop semi-permanent staging areas to cut down on the amount of disturbed area.

- Restrict access on unpaved areas to vehicles and equipment that are necessary that day. Limit unnecessary travel and keep the speed under 15 mph on unpaved surface areas.

- Restabilize disturbed surfaces by paving permanent roads and restoring vegetation as soon as possible.

## *What is Trackout?*

Trackout is:

- Dirt, mud, or other debris tracked onto a paved public road by a vehicle leaving a construction site
- Dirt and mud adhering to the exterior or undercarriage of a vehicle leaving a construction site that falls onto a paved public road
- Traces of dirt or other bulk material that spill onto a paved public road from an improperly loaded haul truck leaving a construction site

Trackout carried from a job site onto a paved road can be disturbed by vehicles driving over it and become airborne dust.

## *Why Trackout Must Be Prevented*

Particulate matter ($PM_{10}$) is caused when the material deposited on the pavement is lifted back into the atmosphere—or "re-entrained"—by the tires of vehicles passing over it. A large portion of the $PM_{10}$ in the Valley's air is caused by vehicle re-entrainment.

Under Maricopa County Rule 310, control of trackout is required for all work sites having a disturbed surface area of at least five acres or from which 100 cubic yards of materials are hauled each day.

Trackout can be removed from paved roads using a wet broom or street sweeper, or by manually sweeping up the deposits.

## *Ways of Controlling Trackout*

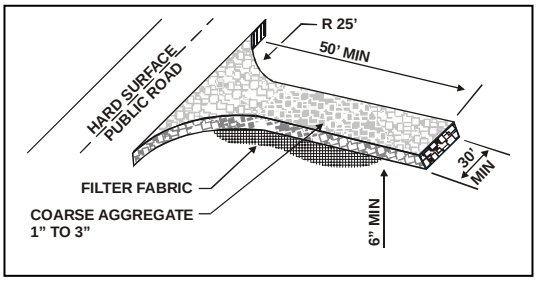
Trackout can be controlled at all exits onto paved public roads using any of the following:

**Gravel Pad** - A gravel pad is a stabilized construction entrance, designed to remove the mud and dirt from the tires of vehicles leaving a construction site.

Using gravel pads reduces fugitive dust caused by trackout onto paved roads and surfaces. The use of such pads may also reduce the need for street sweepers or laborers to remove trackout from paved surfaces, as well as help prevent storm water pollution.

Dust Control Plans require that stabilized construction entrances be installed at all access points if any material is to be hauled on or off the site, or if the site is larger than 5 acres.

*Gravel Pad Design:* Use one inch (1") to three inches (3") in diameter, washed, well graded gravel or crushed rock. The gravel pad should be at least 30' wide by 50' long, and a minimum of 6" deep. When installing the gravel pad, make sure that it is properly graded.




**Grizzly** - A device using rails, pipes or grates to dislodge mud, dirt and debris from the tires and undercarriage of vehicles prior to leaving the work site. An example of a grizzly is the "shaker" invented by Jeff Lange for Kitchell Contracting. This device is reusable, transportable by pick-up truck, easy to assemble, and can be expanded to accommodate various sizes of haul vehicles.

More information about the shaker device used by Kitchell Contracting can be obtained at www.trackoutcontrol.com.

**Paving** - The paved surface must extend from the point of intersection with a paved public roadway at least 100 feet back onto the site and have a width of at least 20 feet.

In addition, cleanup of trackout must be done immediately, if it extends 50 linear feet or more onto the paved public road. Otherwise, the trackout must be cleaned up by the end of the workday. Cleanup may be performed with a street sweeper or wet broom or by manually sweeping up the deposits.

## *Effective Watering*

Watering is a very effective dust suppressant. When applied regularly, water provides temporary stabilization to disturbed surface areas and reduces fugitive dust caused by earthmoving and driving on non-stabilized surface areas. Water also aids in compaction.

Maricopa County Earthmoving Permits require that fugitive dust generated from all earthmoving activities be controlled. Watering is one way to control fugitive dust.

How much watering is enough?

- Roads and disturbed surfaces visibly appear moist with minimal silt
- Soil has a crusted surface and is not easily crumbled between your fingers
- Soil moisture content is optimum for compaction
- Visible emissions are less than 20 percent opacity

Proper site watering is an effective means of controlling dust.

## *Some Techniques That May Work*

Prior to Any Activity on Site -

- Wet the area to depth of cuts or equipment penetration

For Active Operations -

- Apply water 15-30 minutes before starting operations
- Apply water at the end of the day (e.g. soak overnight the next day's work area)
- Before and after grading, water using a water truck

- During trenching, water using a fine spray or mist
- During screening, mist material after it drops from the screen

After Clearing an Area -

- Apply water in sufficient frequency to prevent visible emissions (at least every 2 hours)
- Automatic sprinkler/spray bar systems are optimal in cleared areas

For Unpaved Haul Roads/ Access Roads/Equipment Paths -

- Apply water in sufficient quantity to maintain a moist surface
- Do not over-water - muddy conditions increase track-out

Water Penetration

- Surfactants or palliatives added to water increase penetration, especially in high clay soils

If the area is inaccessible to water trucks due to slope conditions or other safety factors, watering should be conducted with water hoses or sprinkler systems. Remember that many cities have restrictions for construction on sloped areas—be sure you comply with those as well.

## *Dust Palliatives*

Dust palliatives are products that are applied to soil surfaces in order to limit the creation of fugitive dust emissions. For many projects, dust palliatives can be an effective and economical alternative to watering.

A variety of products are available, and finding one that fits your project's activities can reduce the need for regular, frequent watering, resulting in significant cost savings over the long term. In some instances, the soil stabilization from dust palliative application can last from 1 to 12 months.

Some dust palliatives are not designed for areas subject to daily disturbances, high volume traffic, or heavy equipment traffic—check with the product vendor if these conditions exist at your site.

Be sure to ask the product vendor for the recommended dilution, application rate, and application frequency of the product you choose because these vary significantly by product. Before a weekend, holiday, or other inactive period of less than 5 days, a dust palliative that is diluted to not less than 1/20 of the concentration required to stabilize a surface for 6 months is recommended.

Maricopa County recommends the use of non-toxic, non-corrosive products. A contractor is responsible for assuring that its use of dust palliatives is in compliance with all applicable environmental laws.

Use of dust suppressants may be more cost effective than watering for areas of exposed soil that experience little or no traffic.

## *Wind Barriers*

Dust blown by wind from a construction site is considered fugitive dust and subject to the provisions of Maricopa County Rule 310.

Wind barriers are placed along one or more sides of a job site to reduce the amount of wind blown dust leaving the site. Creating a wind barrier could involve installing wind fences, constructing berms, or parking on-site equipment so that it blocks the wind. Alone, these barriers are not adequate for controlling dust. Wind barriers must be implemented together with the application of water or dust palliatives. These barriers increase the dust control effectiveness of water or palliative application.

Effective wind barriers/fences on the job site are:

- 3 to 5 feet high adjacent to roads and urban areas
- Made of material with a porosity of 50 percent or less

Effective wind barriers / temporary enclosures for storage piles are:

- A three-sided structure as high as the pile
- Made of material with a porosity of 50 percent or less

Effective wind barriers must have a porosity of 50 percent or less.

## *Material Handling*

Material handling refers to many types of earthmoving activities on construction sites, including loading and hauling. These types of activities can be significant sources of fugitive dust. However, dust control during loading and hauling can be easily achieved through careful planning and proper implementation of controls.

Loading:

- Mist material with water while stacking.
- Mix excavated material with water prior to loading.
- Empty loader slowly and keep bucket close to the truck while dumping.

Hauling:

- Tarps are required on haul trucks to prevent wind blown dust.
- Do not overload the truck! Keep your load 3 to 6 inches below the freeboard to minimize spillage.

- Check belly-dump truck seals regularly and remove any trapped rocks to prevent spillage

Track-out:

- Daily vacuuming or wet broom cleaning is required to control track-out.
- Install a gravel pad at the access point to your site.
- Use grizzlies to remove excess dirt from trucks.

Loaded haul trucks must be covered with tarps to prevent wind blown dust during transport.

# *Visible Emissions and Opacity*

## What is Opacity?

Opacity is the reduction in visibility caused by a cloud of dust. The standard limitation for Visible Emissions within Maricopa County is 20 percent opacity.

## How Much is 20 Percent Opacity?

County inspectors are trained to read opacity, but there are ways that you can estimate opacity on the job. Twenty percent (20%) opacity is a faint cloud of dust through which you can readily see background details.

Photo shows barely discernable difference between clear conditions (left) and 20 percent opacity (right).

## When are Controls of Visible Emissions Required?

Measures controlling visible emissions must be implemented during all periods of dust generating operations. The specific dust control measures, including contingency measures, are contained in the Dust Control Plan which is part of each regulated site's earthmoving permit.

A regulated site should implement contingency measures as necessary to prevent visible emissions from reaching 20 percent opacity, rather than waiting until emissions reach that level. Additional precautions should be taken to prevent the dust cloud from crossing the property line.

## When Does the Opacity Limitation Apply?

The 20 percent opacity limitation applies at all times except when the average wind speed is greater than 25 miles per hour (25 mph) provided that all reasonable available control measures contained in the approved Dust Control Plan are in place.

## Visible Emissions Testing

Twice a year classes are held for certification in reading Visible Emissions. All superintendents, project managers, and foremen are encouraged to attend these classes. Becoming certified enables you to determine opacity and your project's level of compliance with this requirement. Contact Maricopa County at 506-6700 for details on class times and locations.

Participants in "Smoke School" learn to accurately estimate the level of opacity of dust plumes such as this one caused by field plowing .